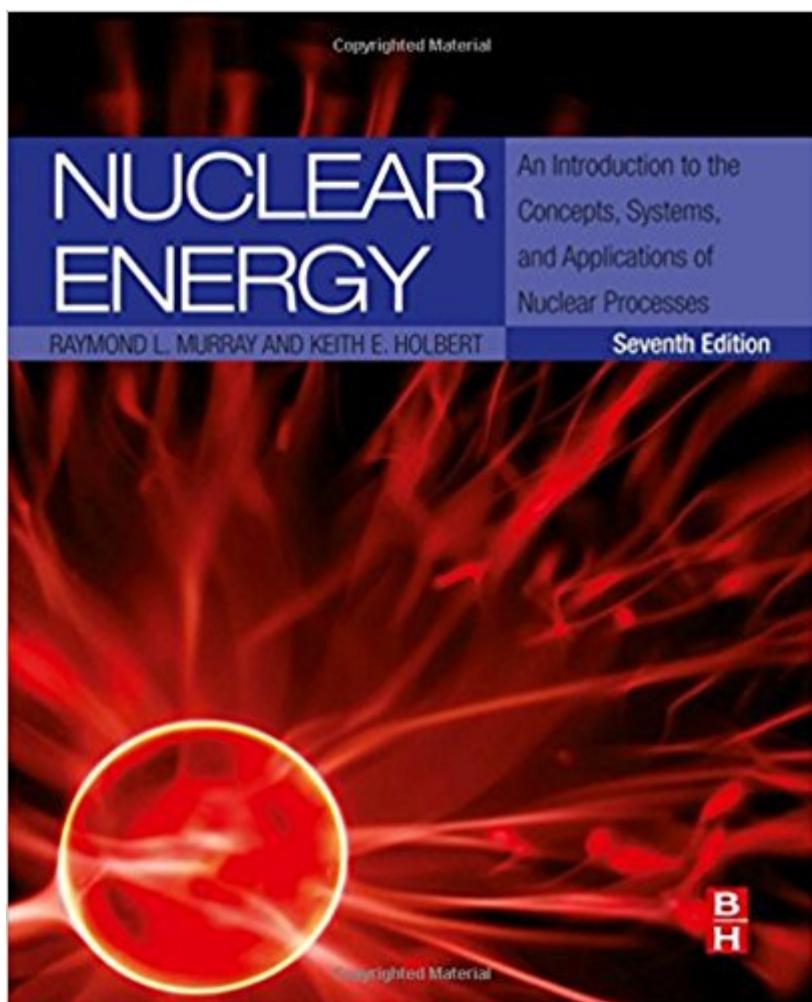


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# Nuclear Energy, Seventh Edition: An Introduction To The Concepts, Systems, And Applications Of Nuclear Processes



## Synopsis

Nuclear Energy is one of the most popular texts ever published on basic nuclear physics, systems, and applications of nuclear energy. This newest edition continues the tradition of offering a holistic treatment of everything the undergraduate engineering student needs to know in a clear and accessible way. The book presents a comprehensive overview of radioactivity, radiation protection, nuclear reactors, waste disposal, and nuclear medicine. The seventh edition is restructured into three parts: Basic Concepts, Nuclear Power (including new chapters on nuclear power plants and introduction to reactor theory), and Radiation and Its Uses. Part Two in particular has been updated with current developments, including a new section on Reactor Safety and Security (with a discussion of the Fukushima Daiichi accident); updated information on naval and space propulsion; and revised and updated information on radioactive waste storage, transportation, and disposal. Part Three features new content on biological effects of radiation, radiation standards, and radiation detection. Coverage of energy economics integrated into appropriate chapters. More worked examples and end of chapter exercises. Updated final chapter on nuclear explosions for current geopolitical developments.

## Book Information

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## Customer Reviews

"This book presents basic concepts in nuclear energy in crisp and elegant fashion. Prof. Murray has done an excellent job with this fifth edition." -Shripad T. Revankar, Purdue University

This book is for beginners, and it is especially useful for the engineer or scientist who has no previous knowledge of

nuclear energy but who wishes to get up to speed and become familiar with the general problems. This is a fine book and will, I believe, help to show students that nuclear engineering, and its associated fields, are worthwhile areas in which to plan a career. - --M.M.R Williams, Emeritus Professor of Nuclear Engineering, University of London

This book provides nuclear engineers, plant designers and radiation physicists with a comprehensive overview of nuclear energy and its uses, and discusses potential problems and the outlook for the future. --This text refers to an out of print or unavailable edition of this title.

"Nuclear Energy" by Raymond L. Murray now has a sixth edition available, and while I read and am reviewing the fifth edition, I encourage anyone who wants to read this generally fine book to obtain the latest edition. In this volume Murray covers a very broad swath of information, focusing on nuclear processes and civilian nuclear power, but also delving into international aspects of nuclear power, nuclear explosions and armaments, future uses of nuclear power, regulatory issues, and waste disposal. Each chapter is well formulated, and I especially appreciated the concise summaries at the end of chapters. I found the chapters on nuclear processes to be the best in the book, and particularly enjoyed chapter 12, "Heat Generation and Removal," and found his explanation of nucleate boiling, film boiling, and departure from nucleate boiling ratio" (DNBR, p. 151) to be the most comprehensible I have ever read in an introductory text. I read the book to enhance my understanding of commercial fission reactors mostly to grasp engineered safety systems in operational reactors. In that vein, some sections of the book are a bit esoteric, although still interesting. For instance, some of the discussion in the section 14.6, "Prospects For Fusion" (p.188) goes into such things as the compact stellarator, spherical torus, reversed field pinch, spheromak, floating multipole, and z-pinch concepts in the discussion of magnetic fusion focused on the tokamak mode. My critique isn't that the material is bad, but that most readers of the book are focused on much more basic information. The fusion discussion is by no means a waste overall though, and I particularly liked the inclusion of a quote from fusion pioneer Lyman Spitzer on p. 190 that justifies the entire research discipline: "A fifty percent probability of getting a power source that would last a billion years is worth a great deal of enthusiasm." Brilliant. While most of the book is very well written, I found isolated sections to be very confusing, particularly section 17.7, "Neutron Activation Analysis," which I re-read several times and still struggled with. Hopefully this has been fixed in the sixth edition, though thankfully these weaker areas are relatively rare. As an aside, some of the exercises require mathematical leaps most people will be unable to make unless the material

is taught more in-depth in a classroom environment. This can prove frustrating. Chapter 22, "Radioactive Waste Disposal," is one of the most important in the book, and also a subject that has drastically changed since this edition was written, most recently with the decision of the Obama administration with the support of Energy Secretary Steven Chu and Senator Harry Reid of Nevada to terminate the Yucca Mountain facility with no plan whatsoever to provide an alternate facility. This latest government boondoggle puts politics over scientific validity, but that comes as no surprise, as Murray points out the failure of Jimmy Carter's equally naive political views on nuclear proliferation and reprocessing on p. 343: "Concern about international proliferation of nuclear weapons prompted President Carter in 1977 to issue a ban on reprocessing. It was believed that if the U.S. refrained from reprocessing, it would set an example to other countries. The action had no effect, since the U.S. had made no real sacrifice, having abundant uranium and coal reserves, but countries lacking resources saw full utilization of uranium in their best interests." Of course by eliminating the prospect of reprocessing, Carter committed the U.S. to a "once through" nuclear power system with much greater waste issues to deal with than would occur were reprocessing to be implemented. Chapter 23, "Laws, Regulations, and Organizations," is of key importance to understanding the industry, and I especially appreciated the information on Performance-Based regulation (pp. 367-368) in the discussion of the Nuclear Regulatory Commission. I likewise found the information on the "Institute of Nuclear Power Operations" (INPO) on pp. 370-373 to be excellent. (For more information on INPO I refer readers to the excellent book "Hostages of Each Other" by Joseph Rees.) The country-by-country overview of nuclear power capabilities in chapter 25 is an excellent resource, but is now quite out of date; I'm sure the sixth edition will provide an excellent updated version of the data. Chapter 26, "Nuclear Explosions," tackles militarized nuclear systems, and is generally good, though there are some utopian visions expressed that have no place in a book of this nature, most notably in the summary on p. 435: "In addition to continued efforts to reduce the stockpile of armaments, to secure workable treaties, and utilize technology to provide protection, there is an urgent need to eliminate all the unfavorable conditions-social, economic, and cultural-that prompt conflict in the world." Yeah, that'll happen. Overall I like the book and while some of the material is a tad esoteric for presentation in an introductory book, the enormity of the subject is generally dealt with quite well by Mr. Murray, and I recommend the book for readers with a serious interest in the subject matter.

My son, for whom I purchased this book, says that it's an excellent introduction to Nuclear Energy in its different applications. The only thing he would add to it to enable a 5-star rating would be a

review of atoms, protons, electrons, etc. Apparently, with such a review, even I, whose background in those subjects spans more than 40 years in the past, would readily understand the book.

An excellent book. I am an amateur nuclear enthusiast and have found this book to answer many questions. I think it is a must for the library of anyone really interested in the fascinating field of nuclear energy and reactors. Some of it is a bit on the "deep" side, but still worthwhile.

The 7th edition of Nuclear Energy effectively and efficiently covered the concepts and necessary areas of interest for the understanding of radiation across several disciplines. The use of definitions and mathematics with the addition of problem solving at different levels of sophistication raised the rating to 5 stars

This edition was published in 2009. I owned an earlier (4th) edition. This edition has coverage of issues that the title might not lead one to expect, such as Energy Economics, Laws, Regulations and Organizations, and the Future. The book is not highly mathematical and is highly readable. Look at the Table of Contents. I certainly recommend this book to anyone interested in an overall picture of nuclear technology with enough math and equations thrown in to be valuable. Most chapters have good numerical problems (answers in back) and there is a very good listing of references and additional reading sources.

I use this book for reference and find it to be excellent.

Was in excellent condition, as expected. No complaints

Great book, excellent condition. Might be a little dry if you're not into nuclear engineering.

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